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REMARKS

Applicants respectfully request reconsideration of the rejections of claims 1-8, 10-12, 19, 21-23, and 25, including independent claims 1, 19, 21, and 25.

The Examiner rejected claims 1, 2, 5-8, 10-12, 19, 21-23 and 25 pursuant to 35 U.S.C. §102(a) as anticipated by Christopher, et al. (U.S. 2003/0045797). Claim 21 was rejected pursuant to 35 U.S.C. §102 as anticipated by Pan (U.S. Patent No. 6,322,509), Mo (U.S. Patent No. 6,577,967), and by Bakircioglu (U.S. Patent No. 6,733,454). Claims 3 and 4 were rejected pursuant to 35 U.S.C. §103(a) as unpatentable over Christopher, et al.

Independent claim 1 recites firing at least first and second sequences of spectral Doppler pulses in response to first and second different settings of the spectral Doppler parameter, respectively, determining at least first and second goal values in response to the first and second sequences, respectively, estimating a change of a spectral Doppler parameter from the first and second goal values, and automatically setting, at a third setting the same or different than one or both of the first and second settings, the optimal spectral Doppler parameter as a function of the estimated change.

As noted by the Examiner, Christopher, et al. operate with settings at a given time based on a most recently used sequence. A sequence is acquired using one setting. The sequence is used to determine a new setting. The previous setting only influences the acquired data, but the new setting is based on the values measured from the acquired data (paragraphs 17-19). Christopher, et al. use data influenced by, but do not use, other previous settings or values to determine a new value. Christopher, et al. do not estimate a change from multiple goal values (with or without other information) from different sequences.

Independent claim 19 recites firing at least one Doppler pulse into an identified region, automatically setting transmit frequency, filter settings, or combinations thereof in response to an echo signal from firing, and estimating a first setting from previous settings, wherein setting comprises automatically setting as a function of the estimated first setting. Christopher, et al. set a parameter from one previous setting (see paragraphs 17-19). The echoes may be responsive to a previous series of settings/optimizations, but a future setting is

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set from the echoes and one current setting. Christopher, et al. do not estimate a first or one setting from previous settings (plural) and the echoes.

Independent claim 21 recites a processor operative to determine at least first and second values in response to the first and second sequences, respectively, estimate a change of a spectral Doppler parameter as a numerical optimization function of the first and second values, and automatically set the spectral Doppler parameter as a function of the estimated change. The cited references, Christopher, et al., Pan, Mo, and Bakircioglu, do not disclose these limitations.

Christopher, et al. calculate a value based on echoes and a current setting. Two values from two sequences are not optimized numerically. Christopher, et al. optimize by continuing measurement from echo signals acquired using the last setting. A numerical optimization function is not used.

Mo determines the optimal setting by weighting the current setting with a scale factor (col. 8, lines 43-54). The scale factor adapts to the spectrum (col. 7, lines 40-45). Mo estimates the change by calculating a scale factor based on the signal edges closest to the baseline (Figs. 6A-6D). There is no suggestion for a numerical optimization function.

Similarly, Bakircioglu determines the optimal setting from the signals returned from one setting. A weight is applied to the current setting for pulse repetition frequency (col. 11, lines 39-43). The maximum signal and noise based on the current setting are used to map the dynamic range (col. 12, lines 25-56). The gain is set to center the dynamic range between thresholds (col. 12, lines 57-62). Bakircioglu estimates the changes by applying specific functions or formulas to the current setting (pulse repetition frequency), or based on thresholds (dynamic range and gain). Bakircioglu does not disclose a numerical optimization function.

Pan automatically adjusts gate position, scan line angle, and size based on image data (abstract). The vessel size, length, area or other characteristic is used to set the position (col. 8, lines 10-23). The image data may be binarized (col. 8, lines 41-45) and a center of the desired vessel is located (col. 10, lines 45-67). The image data is also used to determine the orientation for scan line angle and the diameter for gate size (col. 11, lines 11-17). Image information (B-mode or 2D Doppler) is used to set the position, size and angle. Pan does not

disclose numerical optimization. Pan does not use values responsive to spectral Doppler sequences to estimate the change.

In response to the arguments above for Mo, Bakircioglu, and Pan, the Examiner alleges that, in order to automate feedback, there is inherently some type of numerical optimization, such as a computer determining an optimal parameter with numerical comparison. However, numerical optimization is a term of art in mathematics. A type of mathematical function is recited. Using a computer to optimize a setting by feedback (e.g. change setting A from value 1 to value 2 based on measurement of signal acquired using value 1) is not the computer implementing a numerical optimization function with two values. The cited references use one setting value and a measurement to determine the next setting value, so do not use two of the setting values in a numerical optimization to find a next setting.

Independent claim 25 recites adaptively performing zero or more iterations of acts based on the first and second goal values. Claim 25 sets a parameter based on previous goal values, not just one goal value, determined from transmissions. The goal values are above or beyond mere echoes. Christopher, et al. use one goal value and echoes, not a plurality of goal values, to determine a current setting.

Dependent claims 2-8, 10-12, and 22-23 depend from claims 1 and 21, and are allowable for the same reasons as the corresponding base claim. Further limitations patentably distinguish from the cited references.

Claim 4 recites Doppler gain. The Examiner alleges this as obvious, but the Examiner and Christopher, et al. do not enable Doppler gain since the A, B, and V values used by Christopher all relate to position on the display.

Claim 6 was not rejected, so should be indicated as allowable.

Claim 8 recites estimating a vector corresponding to two different spectral Doppler parameters and setting both parameters as a function of the vector. Pan uses a vector to set the scan line angle. The vector is a 2D image based vector. The vector does not correspond to two different spectral Doppler parameters and two parameters are not set as a function of the vector.

Claim 10 recites a spectral intensity sum. Christopher, et al. use position information, and mean, not an intensity sum.

Claim 11 recites goal values as spectral signal-to-noise sums. Christopher, et al. do not use signal-to-noise.

Claim 22 depends from claim 21, but the same base reference was not used in the rejection. Claim 22 is allowable.

CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call Craig Summerfield at (312) 321-4726.

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